

WHAT IS CLAIMED IS:

1 1. In a network having a plurality of nodes arranged in at
2 least two zones, a method for a particular node to
3 determine a current partial topological state of the
4 network, the method comprising:

- 5 a) determining a zone of the network in which the
6 particular node resides;
7 b) for each node in the zone, determining nodes
8 having a physical communication link with the node in
9 the zone; and
10 c) for each zone in the network, determining zones
11 having a virtual connection with the zone in the
12 network.

1 2. The method of claim 1 wherein the act of determining
2 nodes having a physical communication link with the node in
3 the zone includes:

- 4 i) broadcasting a link request from the node;
5 ii) if a response to the link request is
6 received by the node,
7 A) if the response was from a node within
8 the same zone as the node, storing an
9 identifier of the responding node, and
10 B) if the response was from a node that is
11 not within the same zone as the node,
12 storing an identifier of the zone to which
13 the responding node belongs; and
14 iii) broadcasting, from the particular node, a
15 link state message including any identifier of
16 the responding node and any identifier of the

17 zone to which the responding node belongs, stored
18 in act (b) (ii). ✓

1 3. The method of claim 2, wherein the act of determining
2 nodes having a physical communication link with the node in
3 the zone further includes:

4 iv) if a link state message is received, by the
5 node, from another node, then storing the link
6 state message if the other node is within the
7 same zone as the particular node.

1 4. The method of claim 1, wherein the act, for each zone
2 in the network, of determining zones having a virtual
3 connection with the zone in the network includes:

4 i) determining whether another zone has a node
5 with a physical communications link with a node
6 in the zone, and
7 ii) if it is determined that the other zone has
8 a node with a physical communications link with
9 the zone in the zone, then storing a data
10 structure including an identification of the
11 other zone.

1 5. The method of claim 4, wherein the act, for each zone
2 in the network, of determining zones having a virtual
3 connection with the zone in the network further includes:

4 iii) sending data structures stored in act
5 (c) (2) throughout the network.

1 6. The method of claim 5 wherein the data structures
2 stored in act (c) (2) are only broadcast by gateway nodes.

1 7. In a network having a plurality of nodes arranged in at
2 least two zones, a method for a particular node to
3 determine a current partial topological state of the
4 network, the method comprising:

- 5 a) for each node in a zone in which the particular
6 node resides, determining nodes having a physical
7 communication link with the node in the zone; and
8 b) for each zone in the network, determining zones
9 having a virtual connection with the zone in the
10 network.

1 8. The method of claim 7 wherein the act of determining
2 nodes having a physical communication link with the node in
3 the zone includes:

- 4 i) broadcasting a link request from the node;
5 ii) if a response to the link request is
6 received by the node,
7 A) if the response was from a node within
8 the same zone as the node, storing an
9 identifier of the responding node, and
10 B) if the response was from a node that is
11 not within the same zone as the node,
12 storing an identifier of the zone to which
13 the responding node belongs; and
14 iii) broadcasting, from the particular node, a
15 link state message including any identifier of
16 the responding node and any identifier of the
17 zone to which the responding node belongs, stored
18 in act (b)(ii).

1 9. The method of claim 7, wherein the act, for each zone
2 in the network of determining zones having a virtual
3 connection with the zone in the network includes:

- 4 i) determining whether another zone has a node
5 with a physical communications link with a node
6 in the zone, and
- 7 ii) if it is determined that the other zone has
8 a node with a physical communications link with
9 the zone in the zone, then storing a data
10 structure including an identification of the
11 other zone.

1 10. In a network having a plurality of nodes arranged in
2 at least two zones, a method for transmitting data from a
3 first node in the network to a second node in the network,
4 the method comprising:

- 5 a) determining whether or not the second node is in
6 the same zone as the first node;
- 7 b1) if it is determined that the second node is in
8 the same zone as the first node, then routing the data
9 towards the second node based on an intra-zone routing
10 table; and
- 11 b2) if it is determined that the second node is not
12 in the same zone as the first node, then
 - 13 i) transmitting a location request,
 - 14 ii) if a response to the location request is
15 received, then ensuring that the data is provided
16 with a zone identifier and node identifier for
17 the second node, and
 - 18 iii) routing the data based on an inter-zone
19 routing table.

1 11. In a network having a plurality of nodes arranged in
2 at least two zones, a method for a particular node to
3 respond to a request for the location of a destination
4 node, the method comprising:

- 5 a) determining whether or not the destination node is
6 in the zone of the particular node; and
7 b) if the zone of the destination node is in the zone
8 of the particular node, transmitting a reply message
9 which includes an identifier of the zone of the
10 particular node.

1 12. The method of claim 11 wherein the step of determining
2 whether or not the destination node is in the zone of a
3 particular node is done based on the contents of a
4 intra-zone routing table of the particular node.

1 13. In a network having a plurality of nodes arranged in
2 at least two zones, a method for a particular node to
3 forward data towards a destination node in a destination
4 zone, the method comprising:

- 5 a) determining whether or not the destination zone of
6 the data is the same as the zone of the particular
7 node;
8 b1) if it is determined that the destination zone of
9 the data is not the same as the zone of the particular
10 node, then advancing the data towards the destination
11 zone based on an inter-zone routing table; and
12 b2) if it is determined that the destination zone of
13 the data is the same as the zone of the particular
14 node, but that the particular node is not the
15 destination node, then advancing the data towards the
16 destination node based on an intra-zone routing table.

- 1 14. The method of claim 13 further comprising:
2 b3) if it is determined that the destination zone of
3 the data is the same as the zone of the particular
4 node, and that the particular node is the destination
5 node, then reading the data.
- 1 15. A network having a plurality of nodes arranged in at
2 least two zones, each node comprising:
3 a) a storage device, the storage device storing
4 i) a value identifying one of the at least two
5 zones in which the current node resides,
6 ii) a list of nodes with which the current node
7 has a physical communications link, and
8 iii) a list of zones with which the one of the
9 at least two zones has a virtual connection; and
10 b) a processor which can access information stored on
11 the storage device.
- 1 16. The network of claim 15, wherein the storage device
2 further stores
3 iv) an intra-zone routing table, and
4 v) an inter-zone routing table.
- 1 17. The network of claim 15, wherein the storage device
2 further stores
3 iv) a list of zones which include a node with
4 which the current node has a physical
5 communications link.
- 1 18. In a network having a plurality of nodes arranged in
2 at least two zones, a node comprising:

3 a) a storage device, the storage device storing
4 i) a value identifying one of the at least two
5 zones in which the current node resides,
6 ii) a list of nodes with which the current node
7 has a physical communications link, and
8 iii) a list of zones with which the one of the
9 at least two zones has a virtual connection; and
10 b) a processor which can access information stored on
11 the storage device.

1 19. The node of claim 18, wherein the storage device
2 further stores

3 iv) an intra-zone routing table, and
4 v) an inter-zone routing table.

1 20. The node of claim 18, wherein the storage device
2 further stores

3 iv) a list of zones which include a node with which the
4 current node has a physical communications link.

1 21. In a network having a plurality of nodes arranged in
2 at least two zones, a method for a particular node to
3 generate intra-zone and inter-zone routing tables based on
4 a partial topological current state of the network, the
5 method comprising:

- 6 a) determining a zone of the network in which the
7 particular node resides;
- 8 b) for each node in the zone, determining nodes
9 having a physical communication link with the node in
10 the zone;
- 11 c) determining an intra-zone routing table from the
12 nodes determined to have a physical communication link
13 with the node in the zone;
- 14 d) for each zone in the network, determining zones
15 having a virtual connection with the zone in the
16 network; and
- 17 e) determining an inter-zone routing table from the
18 zones determined to have a virtual connection with the
19 zone in the network.

1 22. In a network having a plurality of nodes arranged in
2 at least two zones, a method for a particular node to
3 generate intra-zone and inter-zone routing tables based on
4 a partial topological current state of the network, the
5 method comprising:
6 a) for each node in the zone, determining nodes
7 having a physical communication link with the node in
8 a zone in which the particular node resides;
9 b) determining an intra-zone routing table from the
10 nodes determined to have a physical communication link
11 with the node in the zone;
12 c) for each zone in the network, determining zones
13 having a virtual connection with the zone in the
14 network; and
15 d) determining an inter-zone routing table from the
16 zones determined to have a virtual connection with the
17 zone in the network.